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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/321,390 05/27/99 LESIEUR

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EXAMINER

IM22/0602

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RIDLEY, B

ART UNIT

PAPER NUMBER


1764

DATE MAILED:

06/02/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trad marks

<p align="center">Office Action Summary</p>	<p>Application No.</p> <p>09/321,390</p>	<p>Applicant(s)</p> <p>LESIEUR, ROGER R.</p>	
	<p>Examiner</p> <p>Basia Ridley </p>	<p>Art Unit</p> <p>1764</p>	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☒ Claim(s) 1-19 and 21 is/are objected to.
- 8) ☐ Claims ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 May 1999 is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some * c) ☐ None of the CERTIFIED copies of the priority documents have been:
1. ☐ received.
2. ☐ received in Application No. (Series Code / Serial Number) ____.
3. ☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

Attachment(s)

- | | |
|---|--|
| <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 18) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____. |
| <input checked="" type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 19) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2</u> . | 20) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:
 - use of term "catalyzed calls" throughout the specification. It is not clear to the examiner what is meant by this term. Are cells of the catalyst bed being changed by a catalytic reaction (being catalyzed)? Is the catalyst used to catalyze cells of the catalyst bed in addition to catalyzing the reforming reaction of fuel gas?

Appropriate correction is required.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, "a high temperature-compatible metal support" (of claim 13) and "said metal support connected to a source of electrical current" (of claim 14) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.
3. The drawings are objected to under 37 CFR 1.83(a) because they fail to show the following details as described in the specification:
 - Fig. 1 does not show "tendrils 4", as described in specification (P8/L2);
 - Fig. 1 does not show "end 8", as described in specification (P8/L8-9), as there are multiple ref. 8 in Fig. 1 pointing to various areas of the catalyst bed;
 - Fig. 1 does not show "end 10", as described in specification (P8/L8-9), as ref. 10 in Fig. 1 points in general direction of the catalyst bed

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- Fig. 2. does not show "inlet end 8", as described in specification (P9/L10), as ref. 8 in Fig. 2 points an area inside the catalyst bed, which does not appear to be different from the area of catalyst bed indicated by reference 2.

Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Correction is required. Applicant is reminded that no new matter shall be added.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description:

- Fig. 2, ref. "D"
- Fig. 2, ref. "10".

Correction is required. Applicant is reminded that no new matter shall be added.

5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because:

- Fig. 1, ref. "2" and "10" have both been used to designate the catalyst bed, as lead lines for both reference numbers point in the general direction of the catalyst bed;
- Fig. 2, ref. "2" and "8" have both been used to designate various areas of the catalyst bed; it is not clear what is the difference between designated areas.

Correction is required.

Claim Objections

6. Claims 1-19 and 21 are objected to because of the following informalities:

- in claims 1 and 21, the term "an outlet process fuel gas passage" (line 8 of both claims) is objected to, suggested correction is --a process fuel gas outlet passage--;
- in claim 13 the term "high temperature-**compatable** metal support" is objected to, suggested correction is -- high temperature-**compatible** metal support--;

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- in claim 19, the term "a hydrocarbon fuel gas reformer assembly" (line 1) is objected to, suggested correction is --a hydrocarbon fuel gas **autothermal** reformer assembly--;
- in claim 20, the component "(a) a monolithic open cell foam core catalyst bed (...)" is followed by component "(d) a fuel gas reforming catalyst (...)", suggested correction is --b) a fuel gas reforming catalyst (...)--.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 1-18 and 20-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 20-22 recite the limitation: catalyst "is operable" (line 4 of claims 1 and 20-21 and line 3 of claim 22). Use of passive voice renders the claim indefinite, and does not allow one skilled in the art to ascertain that which may, or may be not, be readable thereon. How is the catalyst operating? As written claims 1 and 20-22 are unclear.

Claims 1 and 20-22 recite the limitation "the fuel gas" (line 4 of all aforementioned claims). There is insufficient antecedent basis for this limitation in the claim.

The term "minimizing carbon deposition" in claims 1 and 20-22 (lines 5-6 of all aforementioned claims) is a relative term which renders the claims indefinite. The term "minimizing" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably

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apprised of the scope of the invention. How low (or high) should the level of carbon deposition be to read on the claimed invention?

Claims 1 and 20-22 recite the limitation "catalyzed calls" (line 5 of claims 1 and 20, and line 6 of claims 21-22). It is not clear to the examiner what is meant by this limitation. Are cells of the catalyst bed being changed by a catalytic reaction (being catalyzed)? Is the catalyst used to catalyze cells of the catalyst bed in addition to catalyzing the reforming reaction of fuel gas?

Claims 1 and 20-22 recite the limitation "said foam core" (line 6 of all aforementioned claims). There is insufficient antecedent basis for this limitation in the claim.

Regarding claims 1 and 21, it has been held that the functional "whereby" statement (lines 9 and 12 of both claims) does not define any structure and accordingly can not serve to distinguish. *In re Mason*, 114 USPQ 127, 44 CCPA 937 (1957).

Claims 1 and 21 recite the limitation "will be transferred" (line 9 and 13 of both claims). Use of term "will be" renders the claim indefinite, and does not allow one skilled in the art to ascertain that which may, or may be not, be readable thereon. As written claims 1 and 21 are unclear.

Claims 1 and 21 recite the limitation "the processed gas stream" (lines 9-10 of both claims). There is insufficient antecedent basis for this limitation in the claim.

Claim 2 recites the limitation "said catalyst" (line 1). There is insufficient antecedent basis for this limitation in the claim. It is not clear to the examiner which catalyst is this limitation referring to, as two catalysts are being recited in claim 1 (lines 4-5 and line 14) on which claim 2 is depended.

Claim 7 recites the limitation "an iron oxide/calcium oxide catalyst" (line 2). It is not clear to the examiner what is meant by this limitation. Does the catalyst comprise both, iron oxide and calcium oxide, or, does it comprise only one of the compounds, either iron oxide or calcium oxide?

Claims 8 and 15 fail to further limit the claimed invention, as they do not recite any structural limitation of the assembly, but rather their language is directed towards method/process limitations. The claims are indefinite as it is unclear to examiner what structural limitations the applicant is intending to encompass.

Claim 8 recites the limitation "wherein said first region (...) is further promoted with a noble metal catalyst" (lines 1-2). It is not clear to the examiner what is meant by this limitation. What is being promoted? (the **region** or the **catalyst** in the region); and; What is it being promoted with? (a noble metal **catalyst** or a noble **metal**).

Claim 9 recites the limitation "said noble metal catalyst" (line 1). There is insufficient antecedent basis for this limitation in the claim. It is not clear to the examiner which noble metal catalyst is this limitation referring to, as two noble metal catalysts are being recited prior to this limitation (in claims 4 and 8).

Claim 9 states the limitation "selected from the group consisting of platinum, **palladium and rhodium, or mixtures thereof**". This claim is indefinite, as the alternative expressions are in a form of improper Markush group. Suggested correction: --selected from the group consisting of platinum, **palladium, rhodium, and mixtures thereof**--. See MPEP 2173.05(h).

Claims 10-11 recite the limitation "said noble metal catalyst". There is insufficient antecedent basis for this limitation in the claims.

The term "high temperature" in claim 13 is a relative term which renders the claim indefinite. The term "high" is not defined by the claim, the specification does not provide a

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standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. How high should the temperature be to read on the claimed invention?

Claim 13 recites the limitation "high temperature-compatible metal support". It is not clear to the examiner what is meant by this limitation. What specific property should the metal support have to be compatible with high temperature?

Claims 14-15 recite the limitation "said metal support". There is insufficient antecedent basis for this limitation in the claims.

The term "enabling quick start up" in claims 21-22 is a relative term which renders the claims indefinite. The term "quick" (line 5 of both claims) is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. How quick does the star up have to be to read on the claimed invention?

Claims 21-22 recite the limitation "the reformer" (line 5 of both claims). There is insufficient antecedent basis for this limitation in the claims.

9. Claims 1-22 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are:

- claims 1 and 19-22, the structural relationship between the catalyst bed and catalyst. The terms "being provided" (line 3 of claims 1 and 20-22) and "deposited" (last line of claims 1 and 19-21) do not constitute positive structural language and they do not recite the structural features required for the said catalyst to be provided or deposited in said catalyst bed;

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- claims 1 and 21, the structural relationship between the fuel gas inlet passage and outlet processed fuel gas passage. The term "being disposed in heat exchange relationship" (lines 7-8 of both claims) does not constitute positive structural language and it does not recite the structural features required for the said heat exchange to take place;
- claims 1 and 21, the structural relationship between the air inlet passage and processed gas stream. The term "being disposed in heat exchange relationship" (lines 11-12 of both claims) does not constitute positive structural language and it does not recite the structural features required for the said heat exchange to take place.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claim 19, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Clawson (WO 98/08771), in view of Narumiya et al. (USP 4,308,233).

Clawson discloses a similar autothermal reformer assembly (Fig. 3 and Specification), the assembly comprising:

- a) a catalyst bed (200) including an inlet end (210) and an outlet end (270);
- b) a fuel gas/steam mixture inlet passage (208, P20/L7-9);
- c) a fuel gas reforming catalyst (225) deposited in said catalyst bed (200).

While Clawson does disclose using a supported catalyst in the catalyst bed, the reference does not disclose the catalyst being supported on a cylindrical monolithic open cell foam core.

Narumiya et al. teaches a catalyst bed comprising:

- a cylindrical monolithic open cell foam core (Fig. 1, C4/L30-32).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a monolithic open cell foam core structure, as taught by Narumiya et al., as support for the catalyst in the assembly of Clawson, for the purpose of providing structure which allows the fuel gas to always be in contact with the surface of the catalyst to accelerate gas diffusion and to prevent the direct passage of unreacted gas.

12. Claims 1-6, 10-12 and 16-18, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Clawson (WO 98/08771), in view of Narumiya et al. (USP 4,308,233), as set forth above, and further in view of Setzer et al. (USP 4,415,484).

Regarding claims 1 and 16-17, Clawson in view of Narumiya et al. discloses the claimed invention as set forth above. Additionally, Clawson discloses the assembly comprising:

- a) a catalyst bed (200) including an inlet end (210) and an outlet end (270); wherein
 - an inlet portion of said catalyst bed is operable to combust a portion of the fuel gas (P24/L1-7);
- b) a fuel gas inlet passage (208); wherein
 - said fuel gas inlet passage (208) being disposed in heat exchange relationship with an outlet processed gas passage from said catalyst bed (P20/L9-11 & P21/L7-10);
- c) an air inlet passage (232); and
 - said air inlet passage (232) being disposed in heat exchange relationship with processed gas passage from said catalyst bed (P22/L13-15).

While Clawson does disclose combusting portion of the fuel gas in the inlet portion of the reactor, the reference does not disclose the catalyst bed being provided with a catalyst which is operable to combust a portion of the fuel gas.

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Setzer et al. teaches an inlet portion of a catalyst bed being provided with:

- a catalyst which is operable to combust a portion of the fuel gas (C4/L42-52).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a catalyst which is operable to combust a portion of the fuel gas, as taught by Setzer et al., in the inlet portion of the catalyst bed of Clawson, for the purpose of allowing greater flexibility in the maximum allowable reactor temperature and the method of introducing the air into the reactor.

Regarding claims 2-5, Clawson, in view of Narumiya et al. and further in view of Setzer et al. disclose the claimed invention as set forth above. Additionally Setzer et al. teaches an autothermal reformer assembly, wherein:

- said catalyst includes a noble metal and calcium oxide (C2/L5-6);
- said foam core catalyst bed comprises at least two catalyzed regions (C4/L59-63); wherein
- each region has a different catalyst composition (C4/L59-63);
- a first region of said foam core catalyst bed contains a noble metal catalyst in combination with calcium oxide (C3/L21-22 & C4/L53-55);
- a second region of said foam core catalyst bed contains a base metal catalyst in combination with calcium oxide (C3/L20-21 & C4/L45-46).

Regarding claim 6, Clawson, in view of Narumiya et al. and further in view of Setzer et al. disclose the claimed invention as set forth above, but the references do not explicitly disclose said first region containing platinum catalyst and said second region containing a nickel catalyst. As both nickel and platinum catalysts were well known in the art at the time the invention was made (as evidenced by Clawson (P19/L27-P20/L7)), the catalyst selection being driven by system requirements, such as desired catalyst activity, and by catalyst cost. As the specification is silent to

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unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a platinum catalyst in said first region and a nickel catalyst in said second region of the catalyst bed, as disclosed by Clawson, in view of Narumiya et al. and further in view of Setzer et al., for the purpose of obtaining desired catalyst activity.

Regarding claims 10-11, Clawson, in view of Narumiya et al. and further in view of Setzer et al. disclose the claimed invention as set forth above. Additionally Setzer et al. teaches an autothermal reformer assembly, wherein:

- said foam core catalyst bed includes a first region which contains a noble metal and calcium oxide (C4/L53-55);
- said noble metal catalyst is selected from the group consisting of platinum, palladium and rhodium (C4/L53-55).

While Clawson, in view of Narumiya et al. and further in view of Setzer et al. do not explicitly disclose said second region containing noble metal catalyst and not containing calcium oxide, noble metal catalyst not containing calcium oxide were well known in the art at the time the invention was made (as evidenced by Clawson (P19/L27-P20/L7)), the catalyst selection being driven by system requirements, such as desired catalyst activity, and by catalyst cost. As the specification is silent to unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a noble metal catalyst not containing calcium oxide, as disclosed by Clawson, in view of Narumiya et al. and further in view of Setzer et al., for the purpose of obtaining desired catalyst activity.

Regarding claim 12, Clawson, in view of Narumiya et al. and further in view of Setzer et al. disclose the claimed invention as set forth above. Additionally Narumiya et al. teaches an assembly, wherein:

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- said foam core catalyst bed includes at least one ceramic foam support body (C2/L45-49).

Regarding claim 18, Clawson, in view of Narumiya et al. and further in view of Setzer et al. disclose the claimed invention as set forth above. Additionally Clawson discloses an autothermal reformer assembly, wherein:

- said air inlet passage contains air (P23/L19-22).

While Clawson, in view of Narumiya et al. and further in view of Setzer et al. do not explicitly disclose said air inlet passage containing an air/steam mixture, the usage of steam as a temperature modifier and to avoid soot formation in partial oxidation of hydrocarbons was well known in the art at the time the invention was made (as evidenced by Bhattacharyya et al. (USP 5,498,370)). As the specification is silent to unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to add steam to the said air inlet passage, as disclosed by Clawson, in view of Narumiya et al. and further in view of Setzer et al., for the purpose of using the steam as a temperature modifier and to avoid soot formation.

13. Claims 13-15, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Clawson (WO 98/08771), in view of Narumiya et al. (USP 4,308,233), further in view of Setzer et al. (USP 4,415,484), as set forth above, and further in view of Sheller. (USP 5,384,099).

Clawson, in view of Narumiya et al. and further in view of Setzer et al. disclose the claimed invention as set forth above, but they do not disclose the catalyst bed comprising a high temperature-compatible metal support connected to a source of electrical current so as to serve as a resistance heating element by being heated to operating temperature within about twenty seconds of applying electrical current thereto.

Sheller teaches a monolithic catalyst bed, wherein:

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- said catalyst bed includes a high temperature-compatible metal support selected from the group consisting of stainless steel, nickel alloys and iron-aluminum alloys (C1/L26-29);
- said metal support is connected to a source of electrical current, so as to serve as a resistance heating element (C1/L52-63);
- said metal support is electrically heated to operating temperature within about twenty seconds of applying electrical current thereto (C1/L65-66).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a high temperature-compatible metal support connected to a source of electrical current, as taught by Sheller, in the catalyst bed of Clawson, in view of Narumiya et al. and further in view of Setzer et al., for the purpose of activating the catalyst during the start up of the reformer.

14. Claims 20 and 22, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Setzer et al. (USP 4,451,578), in view of Narumiya et al. (USP 4,308,233).

Regarding claim 20, Setzer et al. discloses a similar autothermal reformer assembly comprising:

- a) a catalyst bed (C5/L41);
- an inlet portion of said catalyst bed being provided with a catalyst which is operable to combust a portion of the fuel gas (C5/L54-59);
- d) a fuel gas reforming catalyst deposited in said foam core catalyst bed (C5/L59-C6/L4).

While Setzer et al. does not explicitly disclose the catalyst bed having an inlet end and an outlet end, these elements are inherent in the disclosed assembly.

While Setzer et al. does disclose using a supported catalyst in the catalyst bed, the reference does not disclose the catalyst being supported on a monolithic open cell foam core.

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Narumiya et al. teaches a catalyst bed comprising:

- a monolithic open cell foam core (C4/L30-32).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a monolithic open cell foam core structure, as taught by Narumiya et al., as support for the catalyst in the assembly of Setzer et al., for the purpose of providing structure which allows the fuel gas to always be in contact with the surface of the catalyst to accelerate gas diffusion and to prevent the direct passage of unreacted gas.

Regarding claim 22, Setzer et al., in view of Narumiya et al. disclose the claimed invention as set forth above. Additionally Setzer et al. teaches an autothermal reformer assembly, wherein:

- said catalyst bed is being provided with promoted catalyst (C2/L29-30).

While Setzer et al. does disclose the catalyst bed being provided with promoted catalyst, the reference does not explicitly disclose the bed being promoted with a noble metal catalyst which is operable to combust a portion of the fuel gas at a temperature of about 500°F.

As promoters containing noble metal, were well known in the art at the time the invention was made (as evidenced by Peters (USP 5,110,780)), and as the specification is silent to unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a noble metal-promoted catalyst which is operable to combust a portion of the fuel gas at a temperature of about 500°F in said catalyst bed, as disclosed by Setzer et al., in view of Narumiya et al. for the purpose of increasing catalyst activity and lowering operation temperature.

15. Claims 1 and 7-9 and 21, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Clawson (WO 98/08771), in view of Narumiya et al. (USP 4,308,233), as set forth above, and further in view of Setzer et al. (USP 4,451,578).

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Clawson discloses a similar autothermal reformer assembly (Fig. 3 and Specification), the assembly comprising:

- a) a catalyst bed (200) including an inlet end (210) and an outlet end (270); wherein
 - an inlet portion of said catalyst bed is operable to combust a portion of the fuel gas (P24/L1-7);
- b) a fuel gas inlet passage (208); wherein
 - said fuel gas inlet passage (208) being disposed in heat exchange relationship with an outlet processed gas passage from said catalyst bed (P20/L9-11 & P21/L7-10);
- c) an air inlet passage (232);
 - said air inlet passage (232) being disposed in heat exchange relationship with processed gas passage from said catalyst bed (P22/L13-15); and
- d) a fuel gas reforming catalyst (225) deposited in said catalyst bed (200).

While Clawson does disclose using a supported catalyst in the catalyst bed, the reference does not disclose the catalyst being supported on a monolithic open cell foam core.

Narumiya et al. teaches a catalyst bed comprising:

- a monolithic open cell foam core (C4/L30-32).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a monolithic open cell foam core structure, as taught by Narumiya et al., as support for the catalyst in the assembly of Clawson, for the purpose of providing structure which allows the fuel gas to always be in contact with the surface of the catalyst to accelerate gas diffusion and to prevent the direct passage of unreacted gas.

Additionally, while Clawson does disclose combusting portion of the fuel gas in the inlet portion of the reactor, the reference does not disclose the catalyst bed being provided with a catalyst which is operable to combust a portion of the fuel gas.

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Setzer et al. teaches an inlet portion of a catalyst bed being provided with:

- a catalyst which is operable to combust a portion of the fuel gas (C5/L53-59).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide a catalyst which is operable to combust a portion of the fuel gas, as taught by Setzer et al., in the inlet portion of the catalyst bed of Clawson, for the purpose of allowing greater flexibility in the maximum allowable reactor temperature and the method of introducing the air into the reactor.

Regarding claims 7-9, Clawson, in view of Narumiya et al. and further in view of Setzer et al. disclose the claimed invention as set forth above. Additionally Setzer et al. teaches an autothermal reformer assembly, wherein:

- said first region contains an iron oxide/calcium oxide catalyst, and said second region contains a nickel catalyst (C5/L53-61);
- said first region is further promoted (C2/L29-30).

While Setzer et al. does disclose the first region being further promoted, the reference does not explicitly disclose the region being further promoted with a noble metal catalyst being selected from the group consisting of platinum, palladium and rhodium, or mixtures thereof.

As promoters containing noble metal, specifically platinum, were well known in the art at the time the invention was made (as evidenced by Peters (USP 5,110,780)), and as the specification is silent to unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a platinum promoter in said first region of the catalyst bed as disclosed by Clawson, in view of Narumiya et al. and further in view of Setzer et al., for the purpose of increasing of catalyst activity and lowering the carbon monoxide production in the reactor.

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Regarding claim 21, Clawson, in view of Narumiya et al. and further in view of Setzer et al. disclose the claimed invention as set forth above. Additionally Setzer et al. teaches an autothermal reformer assembly, wherein:

- said catalyst bed being provided with promoted catalyst (C2/L29-30).

While Setzer et al. does disclose the catalyst bed being provided with promoted catalyst, the reference does not explicitly disclose the bed being promoted with a noble metal catalyst which is operable to combust a portion of the fuel gas at a temperature of about 500°F.

As promoters containing noble metal, were well known in the art at the time the invention was made (as evidenced by Peters (USP 5,110,780)), and as the specification is silent to unexpected results, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use a noble metal-promoted catalyst which is operable to combust a portion of the fuel gas at a temperature of about 500°F in said catalyst bed, as disclosed by Setzer et al., in view of Narumiya et al. for the purpose of increasing catalyst activity and lowering operation temperature.

Conclusion

16. In view of the foregoing, none of the claims are allowed.

17. The Group and/or Art Unit location of your application in the PTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Group Art Unit 1764.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Basia Ridley, whose telephone number is (703) 305-5418. The examiner can normally be reached on Monday through Thursday, from 6:45 AM to 5:15 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marian Knode, can be reached on (703) 308-4311.

The fax phone number for Group 1700 is (703) 305-3599 (for Official papers after Final), (703) 305-5408 (for other Official papers) and (703) 305-6078 (for Unofficial papers). When filing

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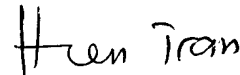
a fax in Group 1700, please indicate in the Header (upper right) "Official" for papers that are to be entered into the file, and "Unofficial" for draft documents and other communication with the PTO that are not for entry into the file of the application. This will expedite processing of your papers.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0661.

Basia Ridley
Examiner
Art Unit 1764



BR
May 30, 2000



HIEN TRAN
PRIMARY EXAMINER